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ABSTRACT

This document reviews the issue of class size reduction, analyzes the evidence from research on the relationship between class size and educational improvement, and cites findings supporting the view that the costs of class size reduction outweigh the benefits and that reducing class size to improve student achievement is inconsistent with the push to enhance teacher professionalism by placing greater demands on teachers. After an introductory overview, the following topics are discussed: (1) the context for reform; (2) the history of the debate; (3) the current debate; (4) perspectives on workload, including statistics on pupil/teacher ratio, pupils per class, pupil load, and staff ratios; and (5) sifting the evidence from standardized tests, state comparisons, and international comparisons. This is followed by a "lesson for America" on classroom culture and class size based on comparisons with the Japanese education system, and a discussion of what teachers can do to manage large classes. Forty-three references are included, and computations are appended. (TE)

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Politics and Panaceas

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Class Size and Public Policy:

Politics and Panaceas

Tommy M. Tomlinson

Programs for the Improvement of Practice

March 1988

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FOREWORD

Of all the beliefs held by American educators, few are more durable than the proposition that smaller classes will yield higher student achievement. It is one of the great "givens" of education in this country. It may also be a very expensive excuse for instructional failure. Over and over, parents are told that significant improvement in student achievement cannot occur until the size of the classes in which their children are taught is substantially shrunk. Yet over and over, class size has shrunk and student achievement has failed to improve.

Indeed, for almost the entire twentieth century, the United States has been shrinking the average size of its elementary and secondary school classes, never more so than during the past 25 years. But this has been an enormously costly thing to do, and recent pressure to accelerate the practice threatens to consume a huge and growing fraction of resources available for educational improvement. To illustrate, were we to reduce the average size of all our public school classes by just one student this year, the bill to be footed by the taxpayers for this change alone would be approximately $5 billion. It becomes even more costly if the added classes require the building of additional classrooms.

Is it worth the money? Will the benefits match the costs? What does the research show? Are there more effective ways to invest education resources? Are there other kinds of changes with greater likelihood of boosting student learning at the same or perhaps less cost to the public?

These are important isssues, especially in the late 1980's, when "reduce class size" is a favorite nostrum of many policymakers and uncounted numbers of education practitioners. So we asked Tommy Tomlinson, a member of our research staff who has long contributed to and kept track of reform initiatives, to review the history of this issue, such evidence as could be gleaned from domestic and foreign education research and practice, and to set forth his findings in clear language. Herewith the results of his work.

Chester E. Finn, Jr.
Assistant Secretary for Research and Improvement
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TABLE OF CONTENTS

Foreword ____ iii

Acknowledgments ____ v

Overview ____ 1

1. Context for Reform ____ 3

2. History of the Debate ____ 7

3. The Current Debate ____ 9

4. Perspectives on Workload ____ 13
   - Pupil/Teacher Ratio ____ 13
   - Pupils per Class ____ 14
   - Pupil Load ____ 18
   - Staff Ratios ____ 20
   - In Search of the Optimum ____ 20

5. Sifting the Evidence ____ 23
   - Standardized Tests ____ 23
   - State Comparisons ____ 26
   - International Comparisons ____ 28

6. Classroom Culture and Class Size: A Lesson for America ____ 31

7. What Can Teachers Do ____ 35

Summary ____ 37

References ____ 39

Computations ____ 43

OVERVIEW

Arguments about class size and its relationship to the intellectual and social growth of children have been heard since the Ancient Greeks. But only in the past 50 years of American education has the subject received serious and scientific study. Despite substantial efforts to establish the link, the educational benefits that would offset the higher costs of smaller classes have been difficult to prove. Nonetheless, many States have recently considered reducing class size as part of their programs for school improvement, and the debate about the issue has intensified. Pupil reductions of any size have substantial cost consequences, and the alleged benefits for students are not the only interests to be served.

There is an array of evidence, both scientific and empirical, that may be brought into this argument. In addition to summarizing the better-known reviews of class size research, evidence is examined from other education systems, notably Japan's, plus the relationship between class size and National and State scores on standardized achievement tests, and the prospect for student growth and instructional innovation in the event class size is substantially reduced.

Taking account of these many and varied sources leads to the following observations:

1. The average pupil/teacher ratio in the Nation's schools has steadily declined for almost 100 years, and today stands at 17.7 pupils per member of the instructional staff, its lowest point ever. The average number of school children in a regularly scheduled class is 24, also an historic low, but higher than pupil/teacher ratio because the duties of many teachers and specialists do not require regular meetings with a full class.

2. The pressure to reduce class size occurs at a time when well-qualified teachers are in short supply and enrollments are growing in many States and regions. Smaller classes will worsen the shortage of both teachers and classrooms, a result that is contrary to the goals of school improvement and higher student achievement.

3. Unless the number of pupils per class is reduced substantially below 20--at least to 15 according to one celebrated research review--little improvement in student achievement may be expected. Since few States are contemplating a reduction to 20 pupils, much less 15, there is little reason to expect the States' efforts to reduce class size to result in improved student achievement.

4. The relationship between standardized test scores and class size is erratic at best and typically inconsistent with the thesis that smaller classes lead to higher achievement.

5. Practices in other societies lend little support to the idea that academic excellence requires smaller classes. Japan, for example, has an average of 41 pupils in its mathematics classes, yet leads the world in math achievement.

6. While higher student achievement is not necessarily the sole reason to reduce class size, there is scant hope that improved instructional practice or the supposed benefits to the social and intellectual growth of students will accompany smaller

classes. Research shows that teachers tend to persist with their established practices (usually lectures) even when given the opportunity to instruct smaller classes. Consequently, teachers themselves will have to learn how to exploit the features of smaller classes before gains may be expected.

Two conclusions may be drawn:

* By itself, reducing class size, a very costly "reform," is unlikely to have tangible benefits for student achievement, at least not in a form or terms that are comprehensible and acceptable to the taxpaying public.

* Reducing class size to improve student achievement is inconsistent with the push to enhance teacher professionalism and the expectations of professional skill that accompany this development.

Accordingly, rather than sink vast sums into an inefficient and unreliable method of school improvement, available resources should instead be directed to improving the quality of instruction and teachers' ability to manage the demands of classrooms as they are currently configured.

1. CONTEXT FOR REFORM

If you ask teachers what can be done to improve their own classroom performance and that of their students, many are likely to suggest reducing class size. Teachers generally share a widespread belief that there are, on average, too many pupils in America's classrooms. Most teachers believe that this, in turn, results in deteriorating instructional quality, intensified wear and tear on faculty, and declines in student achievement. They also argue that larger classes stifle opportunities for personal growth, instructional innovation, individualization, and creativity. Many educators believe that reductions in class size would provide a swift cure for much of what ails American education.

And why should they think otherwise? If anything about education has ever seemed self-evident, it is that smaller classes mean better teaching, and, consequently, more learning. That a relationship exists between class size and student achievement is a virtually unchallenged premise. Lately, the appeal of this view has found favor among a number of State level policymakers, and it is easy to understand why. If true, it is a policymaker's dream: a good cause with widespread support, legislatively feasible in simple and highly accountable language, and easily packaged for public consumption. Like most dreams, however, it is difficult to separate fact from illusion. With an eye to helping policymakers distinguish between the two, it is the task of this paper to clarify the evidence and the interests that shape our views about class size.

Legislating Class Size

The wave of reform and the quest for excellence triggered by the National Commission on Excellence in Education's 1983 report, A Nation at Risk, provided an opportunity to argue for smaller classes as part of a general program of school improvement. Advocates have not missed their chance. California, Indiana, Tennessee, and Texas have developed legislative packages designed to reduce class size, and at last count 14 other States and the District of Columbia had taken or were contemplating steps to pare the average class size in their schools (Education Commission of the States, 1986).

As with so much of the school reform activity of the 1980's, these initiatives are coming primarily from Statehouses and State Legislatures. However, unlike many of the recently mandated, "top-down" reforms that lawmakers impose and educators lament, this one finds widespread favor among teachers. Still, reducing class size is an expensive endeavor, and despite claims of enthusiasts, the benefits of this strategy are, at best, uncertain. The following examples of initiatives underway in a number of States illustrate just how high are the costs and uncertain the results:

- According to the Atlanta Journal, Georgia's House Speaker Tom Murphy "plans to mount a campaign to reduce teacher-pupil ratio to 1-to-15 in the first five grades, a program he acknowledged would "cost a 'ton of money' to hire additional instructors." The State's Director of General Instruction called Murphy's statement "great news," even as he acknowledged that the State faced "big teacher shortages" and would have to step up its already intense recruitment campaign. Meanwhile, the State's legislative budget office estimated that it would cost between $200 million

and $300 million annually to reduce the ratio in all five grades, and that it would require increasing the number of elementary teachers by one-third (Duane Riner in the Atlanta (Georgia) Journal, 7/17/87).

- South Carolina has required districts with more than 9,000 students to reduce the size of their language arts and mathematics classes in grades 7-12 from 28 to 25 pupils per teacher. The State School Boards Association estimates that this will require hiring 227 teachers in 21 school districts at a cost of $5.5 million dollars in additional salaries. Another $3.7 million will be needed to pay for added space (Greenville (South Carolina) News, 6/28/86).

Moving against this tide of support, but clearly aware of the costs that are associated with smaller classes, Mississippi has decided to increase class size:

- The Mississippi legislature has recommended allowing class size to increase as a means of saving money. This proposal would increase the average class size in grades 1-4 from 24 to 25 and in grades 5-12 from 27 to 29 and, in the process, would save the State $26.2 million. State educators were quoted as saying that the increase "would just tear us up," while decreasing the quality of education for students. The president of the local American Federation of Teachers union asserted, "I have always said the smaller the better," but agreed to go along with the plan (Andrew Luna in the Meridian (Mississippi) Star, 3/16/86).

While the simplicity and widespread appeal of smaller classes has led many State policymakers to temper their concerns over the high cost of this reform, plans to improve schools and raise achievement levels by this method have attracted their share of critics. Such skepticism is not without foundation. Indiana's Project PRIMETIME is a case in point.

Project PRIMETIME, sponsored by Governor Robert Orr, who successfully hiked the State sales tax to underwrite it, is an ambitious attempt to boost the performance of primary grade children by teaching them in smaller classes. Toward this end, Indiana has cut the average size of classes in grades K-1 to 18 children and of grades 2-3 to 20 pupils per teacher. However, support for PRIMETIME grew from a demonstration that learning in grades K-2 improved when class size was limited to 14 students (PRIMETIME, 1983). Thus the new policy rests on the debatable assumption that results obtained from a class of 14 youngsters, under conditions specially devised to demonstrate the benefits of smaller classes, will be repeated in ordinary circumstances with classes of 18-20 pupils. The first step in this experiment cost Indiana taxpayers $48 million in 1986-87 and an additional $68 million has been appropriated for 1987-88. Payment for space needed to house the additional elementary classes was postponed temporarily by "borrowing" from currently underutilized high school buildings. However, more costly arrangements may well become necessary as high school enrollments begin to reflect the rising numbers of children now in grade school.

Indiana's situation is not unique. California became embroiled in a still unresolved controversy when the Governor, legislators, and educators argued over the costs and benefits of smaller classes in their schools.

Governor George Deukmejian had proposed cutting the average size of first grade classes from 28 to 22 students. Critics argued that a cut in a single grade would not guarantee later improvement and that to make similar cuts at additional grade levels was financially impossible. They noted, for example, that it would cost $450 million to reduce class size to 20 students for a single grade statewide, and just providing enough

classrooms for the proposal would break many districts' budgets. A leading policy analyst estimated that it would cost California close to a billion dollars to reduce the average class size statewide by 5 students. An expert on the effects of class size also pointed out that unless class size fell to fewer than 20 students, the likely result might be heightened teacher satisfaction, but not increased student achievement. Meanwhile, State Senator Gary Hart observed that shrinking class size at the 1st-grade level ignored the fact that test scores in the first three grades of California schools had improved. Hart suggested that the extra effort to reduce class size should be focused on the middle or high school grades where test results show continued poor performance (Aleta Watson in the San Jose (California) Mercury News, 2/4/87; Deb Kellars in the Sacramento (California) Bee, 2/19/87).

None of this made much difference to the Chairman of the California Commission on the Teaching Profession, who observed that the State had little choice but to reduce class size if it wished to compete effectively (for teachers) with other States boasting lower pupil/teacher ratios (Aleta Watson in the San Jose Mercury News, 3/10/86). Fears that teachers would spurn California for States and communities where smaller classes meant less work were prominent in the appeal for lighter workloads. Yet with teachers already in short supply and with rising enrollments adding to the scarcity, a policy to attract teachers by offering them lighter workloads would doubtless worsen the effects of a teacher shortage.

Despite these uncertainties, many States and localities are determined to improve the quality of educational practice through class size reductions. Threats to public support by querulous legislators, contrary conclusions, and sky-high costs are balanced by the powerful intuitive appeal of the idea. But citizens and their representatives deserve more than intuition to back up a very expensive educational policy. Accordingly, the claims about class size and the evidence offered on their behalf will be examined. The "load" that varying numbers of students impose upon teachers, the effects of that load on pupil achievement, and the probable consequences of a lighter workload for both teachers and students will be discussed. Evidence will be considered from multiple sources and will include the association between class size and standardized test scores, international comparisons of class size and mathematics achievement, and the effects of smaller classes on instructional practice. First, though, the long history of the presumed relationship between class size and student achievement will be reviewed.

2. HISTORY OF THE DEBATE

The origins of the debate over what constitutes optimum class size can be traced back to ancient Greece. Socrates, perhaps the most famous teacher of them all, never actually specified an optimum number; but he kept his classes both exclusive and manageable by limiting them to the rich young men of Athens. His Spartan contemporary, Herodotus (5th century, B.C.), thought the right number was about 30, and that view proved to have great tenacity. Indeed, it has survived the centuries as though it were natural law.

Not that everyone has believed 30 to be the natural optimum. Comenius (1592-1670) thought that any class smaller than several hundred was a waste of time. Locke (1632-1704) argued that classes of 50 or more were impossible to teach effectively, but that 40 was a tolerable number. President James A. Garfield (1831-1881) contributed to this lore when he defined an ideal university as one with educational philosopher, Mark Hopkins, seated at one end of a log and a single student (himself, likely) at the other.

Despite their timeless familiarity, past arguments about optimum class size generated little heat. Indeed, had it not been for the social and educational developments in 19th century America, the disagreement might have remained largely dormant.

Around 1850, a social revolution was underway in the U.S., and it fueled the creation of a vast public school system. Although the Nation was 80 percent rural, its businesses mostly small, and its schoolhouses usually one-room, the vision of schooling as the foundation for democracy and industrial growth sustained a crusade for universal education by social reformers and civic leaders (Tyack and Hansot, 1981). By 1900, 72 percent of American children ages 5-17 were enrolled in school, although just 10 percent of 14- to 17-year-olds were in high school. In 1920 the proportion of children ages 5-17 in school had risen to 78 percent, and the number in high school had tripled to 30 percent. And by 1940, 84 percent of 5- to 17-year-olds were enrolled, with 73 percent going on to high school (Center for Education Statistics, 1987a). Thus, in less than a century, public education in America grew from a reformer's dream to a vast enterprise providing 12 more-or-less consecutive years of schooling to three quarters of the Nation's youth.

As enrollments swelled to massive proportions and costs soared with them, educators searched for more efficient methods to accomplish the job of universal education. The issues were the same then as now: balancing the immediate and tangible costs of supplying teachers and classrooms against the abstract and long term benefits of an educated citizenry. One of the most direct and effective methods to manage the supply (and minimize the cost) of teachers and classrooms against the number of students requiring them was to manipulate class size. Larger classes needed fewer teachers and classrooms, hence the per student cost was less. The response of educators and school reformers to this practice was also the same then as now. They believed that larger classes would increase the teachers' work burden and reduce the efficacy of instruction. This, in turn, would interfere with the children's education and run counter to the goals of the society.

Having registered these contrary claims, the contest began. On one side stood the school board, charged with providing for the educational needs of the community's children while protecting the public's multi-faceted interests, including its purse. On the other side stood the teachers, responsible for instructing and educating the community's children, but attentive also to their own personal and professional interests, including salaries and workload. And so it was that the debate about the role of class size in student achievement was joined by two groups of public servants with interests inherently in conflict with each other, even those they claimed were solely for the educational welfare of the children.

3. THE CURRENT DEBATE

Following publication of A Nation At Risk in 1983, education rose in visibility and political significance, and the argument about smaller classes took a dramatic turn. Some States began proposing to reduce average class size by a few students as a means of improving student achievement and attracting greater numbers of qualified teachers. Few teachers disagreed. Indeed, through their largest professional association, the National Education Association, they had been arguing for years for an even greater reduction:

> The National Education Association believes that excellence in the classroom can best be attained by small class size, particularly in grades K-12, which allows for the optimum development of a student's potential. Class size and daily student-teacher contacts must allow for individual attention to each pupil. The Association urges its affiliates to seek an optimum class size of 15 students (NEA resolution, 1986; first adopted in 1969).

Assume, for the moment, that the basic concept is correct -- smaller is better. One may still wonder why the number 15 was picked. Why not 10? Or 20? Or 30? What evidence supports the assertion that 15 students, or for that matter any fixed number of students, is the "optimum" class size? Optimum according to what criteria? Student achievement? Cost? Workload?

When champions of smaller classes describe the benefits for student achievement, they usually cite the research of Gene Glass and Mary Lee Smith (1979). Their work is popular because prior scientific evidence about class size was inconclusive and Glass and Smith seemed to provide a measure of resolve to the argument. Using a statistical technique called "meta-analysis," that allowed simultaneous consideration of the results of many studies, they examined the results of over 80 of these works that had been completed since 1900. Relying strongly on the 14 "best" studies of the modern (post 1950) period, they concluded that the relationship between class size and student achievement was best described by the "effects curve" in Figure 1.

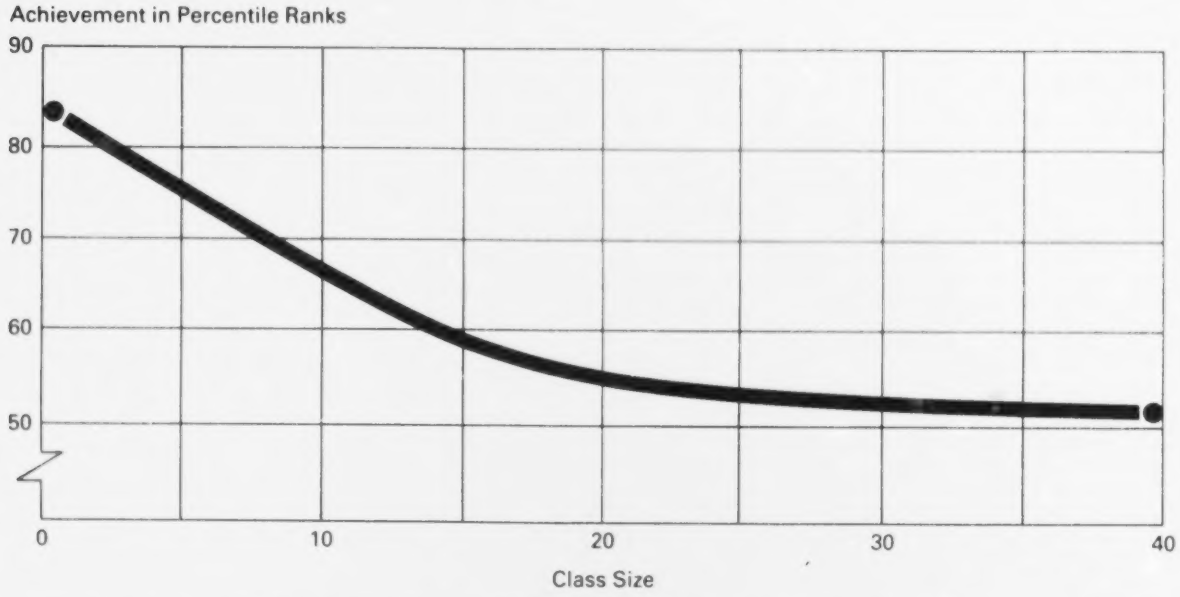
Treated literally, two features of this curve stand out:

First, when there are between 20 and 40 students in a class, student achievement remains largely insensitive to changes in class size. Other things equal, 40 students taught together will learn about 5 percent less than 20 will.

Second, 15 students--NEA's "optimum"--is the class size that first provides a significant improvement in student achievement that is statistically defensible. So, according to these findings, a class whose size alone could reliably improve student performance 10 percent or more would contain no more than 15 students. Since an average class size today is about 24 students, almost a 40 percent reduction would be required to gain about a 10 percent improvement in learning. Currently, no State policy, pending or enacted, meets this standard, and although Indiana's Project PRIMETIME is premised on a class size of 14, the program itself faces far larger (18-20) classes.

Glass and Smith's conclusions were quickly challenged on the grounds that the studies they examined did not permit the interpretations they drew, especially about the

Figure 1.—Relationship Between Achievement and Class Size (Data Integrated Across Approximately 100 Comparisons From Studies Exercising Good Experimental Control).



Source: Glass, G. V. and Smith, M. L. Meta-Analysis of the Search on the Relationship of Class Size and Achievement. Far West Laboratory of Educational Research and Development, San Francisco, CA , 1978.

relationship between achievement and small classes. Critics believed that attributing the observed effects to class size alone not only exaggerated the power of class size but ignored the role of such key variables as student ability, instructional format, and curricular content (Education Research Service, 1980).

Furthermore, critics noted, the immense costs made classes smaller than 15 utterly out of the question. In 1986, for example, a reduction of the national average for regularly convened classes from 24 to 23 pupils would have required almost 73,000 more teachers and $5 billion additional dollars, not counting the expenses of building more classrooms. Reducing the average class to 20 students would require over 335,000 more teachers at an added $22.8 billion. At 15 students, 1 million extra classroom teachers would be needed and added costs close to $69 billion (see Computations at the end of this report). Furthermore, the required number of teachers and the costs of their employment would continue up each year as salaries increased and as more teachers were hired just to keep pace with increased enrollments.

Why should schools, at such great expense, reduce class size to 24 or 20, or even fewer students, if, as Glass and Smith indicated, little improvement can be expected so long as classes exceed 15 students? Couldn't the same or better effects be achieved far more economically by improving instructional practice, instructional technology, the quality of textbooks or the training of teachers? Indeed, Jamison (1982) observed that according to Glass and Smith's effects curve, "increasing class size from an initial point will hurt achievement less than decreasing it from that point will help. Thus for a fixed total number of students and teachers, having a few of the students in small classes and the rest in very large ones will result in higher mean [achievement] scores than having all class sizes be the same." Furthermore, if the average class contains 24 students, then the money released by increasing average class size a few more (not to mention many more) pupils, could pay for substantial investments in alternative methods of school improvement without materially reducing student achievement.

Considering all of this, some observers were driven to complain that the class size argument was itself oversimplified, perhaps even diversionary. Michael Berger (1982), for one, argued that class size was not the central issue. He posed the problem in this manner: "assuming a limited amount of resources, how can we arrange the various elements of the teaching-learning situation so that teachers can teach at some minimal level of acceptability and students can learn in the most conducive educational environment?"

In line with Berger's point, Glen Robinson and James Wittebols (1986) examined the same evidence that Glass and Smith reviewed. However, rather than confining their attention to the relationship of class size to achievement, they also looked at such attendant variables as grade level, subject, teaching practices, and student attitudes. Placing class size in an instructional context yielded rather different conclusions. They found that "The relationships between class size and pupil achievement vary greatly across grade levels, among subject areas, and by methods of instruction." They concluded that the better question was "which students might benefit from smaller classes and under what conditions?"

Glass and Smith's work, it turned out, had not put an end to the class size argument. If anything, it had turned the heat up on the debate. For example, Slavin's (1988) recent review challenges the research as well as the conclusions that both Glass and Smith and Robinson and Wittebols drew from it. He makes the particularly disquieting observation that the largest class size effect in Glass and Smith's review was found in a study of tennis. "Achievement" was measured by the number of times a tennis ball was hit into a wall in 30 seconds.

The public legitimately continues to wonder where the truth lies. So do governors, legislators, and other policymakers. What do teachers and students do in class that makes the number of pupils so important? Do teachers do something different in smaller classes that results in higher achievement, or do fewer kids just get more of the same? Does teaching really become more difficult and learning less likely as class size rises? Is the problem, whatever it is, worse with disadvantaged children? Is the only answer to reduce the number of pupils, or would better classroom management do the job? Public policy deserves answers to these questions, and others like them, before it is written into law. The answers to some of these questions are suggested in the remainder of this paper.

4. PERSPECTIVES ON WORKLOAD

Many teachers believe they are overworked. Plainly, a reduced teacher workload accompanies smaller classes. Indeed, for some time, smaller classes have been a "bargaining chip" in negotiations between teachers and school boards. For example, in bargaining over class size, a union spokesman declared that it was time for teachers to add self-interest and lighter workload to their traditional "selfless approach" of concern for the welfare and achievement of their students (Gewirtz, 1979). One gathers from the argument that teachers believe they have long borne the burden of excessive class size, and that their pleas for relief have been persistently resisted by skeptical and penurious school boards.

In fact, the press for smaller classes has produced substantial progress at the bargaining table over the past 20 years. For example, Goldschmidt, et al. (1984), after looking at the results of union bargaining in 80 school districts with minimum student enrollments of 15,000, concluded that 34 percent of the districts had absolute class size limits for all students, 31 percent had them for handicapped students, and 44 percent had placement restraints on suspended students.

Many jurisdictions have ceilings on their classes which may not be exceeded except at extra cost to the school system and with special benefits to the teachers. Thus, there are few examples of large classes combined with small classes to produce a spurious average. More often, there are upper limits on class size which allow deviation only in the direction of smaller classes.

Furthermore, contract negotiations have usually set class size according to a reasonably rational view of students' needs. For example, different weights may be assigned to students depending on the demands they place on instruction. If "normal" students are weighted 1, then severely handicapped children may be weighted 2 or 2.5, which means their classes will be half or less the size of those for ordinary students. In other instances, limits of class size are set depending on the student's needs, for example, non-handicapped students may not exceed 25 per class, while severely handicapped students may not exceed 12 or 15 per class.

Nonetheless, in order to gauge the merit of their complaint, the trends and magnitude of class size or "pupil load" deserve examination. There are three principal indicators of pupil load: 1) pupils-per-teacher or pupil/teacher ratio, 2) pupils-per-class, and 3) number of pupils taught per teacher per day. All of these measures are sometimes referred to as indicators of class size, and while they are often treated as interchangeable, they each represent somewhat different perspectives on the same phenomenon. Note, however, that the phrase "class size" will be used throughout this paper as a general descriptor for the number of pupils faced by each teacher during a period of instruction. When necessary for clarity, the exact indicator will be named.

Pupil/Teacher Ratio

Consider first the pupil/teacher ratio, an indicator of the number of pupils per teacher. This index is obtained by taking all of the students in a defined entity,

usually a school, school district, State, or region, and dividing their number by all of the instructional personnel in the same entity. Although there is some historical uncertainty about the definition of "teacher," modern computations do not count librarians, teachers' aides, administrators, and guidance counselors as teachers. Earlier computations, therefore, may have overstated the number of teachers and understated the ratio of pupils to teachers. Figure 2 shows a downward trend starting from a peak of 37 pupils per teacher around 1900--the heyday of rural one-room elementary schools--and gently declining until the Great Depression (when adolescent enrollment temporarily increased due to the loss of job opportunities). Thereafter, the slow decline resumed and continued until the mid-1950's, at which point the average ratio was about 27:1. Over the past three decades, coincident with school desegregation and the combined influx of students needing special attention and additional teachers to provide it, the ratio has continued its descent to its present level of less than 18:1 (Center for Education Statistics, 1987a).

The average pupil/teacher ratio is different for public elementary than for public secondary schools, although the trends since 1960 are roughly the same for both. Figure 3 displays these trends in the national average since about 1960 for elementary and secondary public schools. The pupil/teacher ratio at the elementary level has dropped from more than 28:1 in 1960 to about 19:1 in 1986, while the ratio at the secondary level declined from about 22:1 to 16:1. By comparison, although not shown on the graph, the average ratio for all grades in private schools was 17:1 in 1986 (Center for Education Statistics, 1987b).

Pupils Per Class

Compared to pupil/teacher ratio, pupils-per-class is an invariably higher and, many educators believe, a more realistic measure of actual class size. Pupils-per-class is the number of pupils a teacher must face during a period of instruction; it is the classroom unit that receives instruction. Pupils-per-class is determined by the number of teachers who remain after those who teach in special situations outside the classroom are excluded from the count. In this discussion, however, the median number of children per class will be used rather than the mean. The median is the middle-most class size among a distribution of estimates, that is, exactly half of the classes are larger than the median, and exactly half are smaller. The median is the estimate of choice because it is less susceptible to extremes than the mean, and thus better illustrates the typical class size.

In the elementary schools, periodic surveys, illustrated in Figure 4, indicate that the median number of pupils in a classroom for instruction has declined from 30 in 1961 to 24 in 1986 (National Education Association, 1987, p. 33). At the secondary level, the trend is also toward smaller classes, and the median size has declined from 27 in 1981 to 22 in 1986. Note that the median size of elementary schools depends in part on the size of the school system. In large systems, the median class size fell from 31 in 1966 to 26 in 1986; in medium districts from 29 to 24; and in small districts from 27 to 22. There are some interesting additional trends and a few anomalies as well.

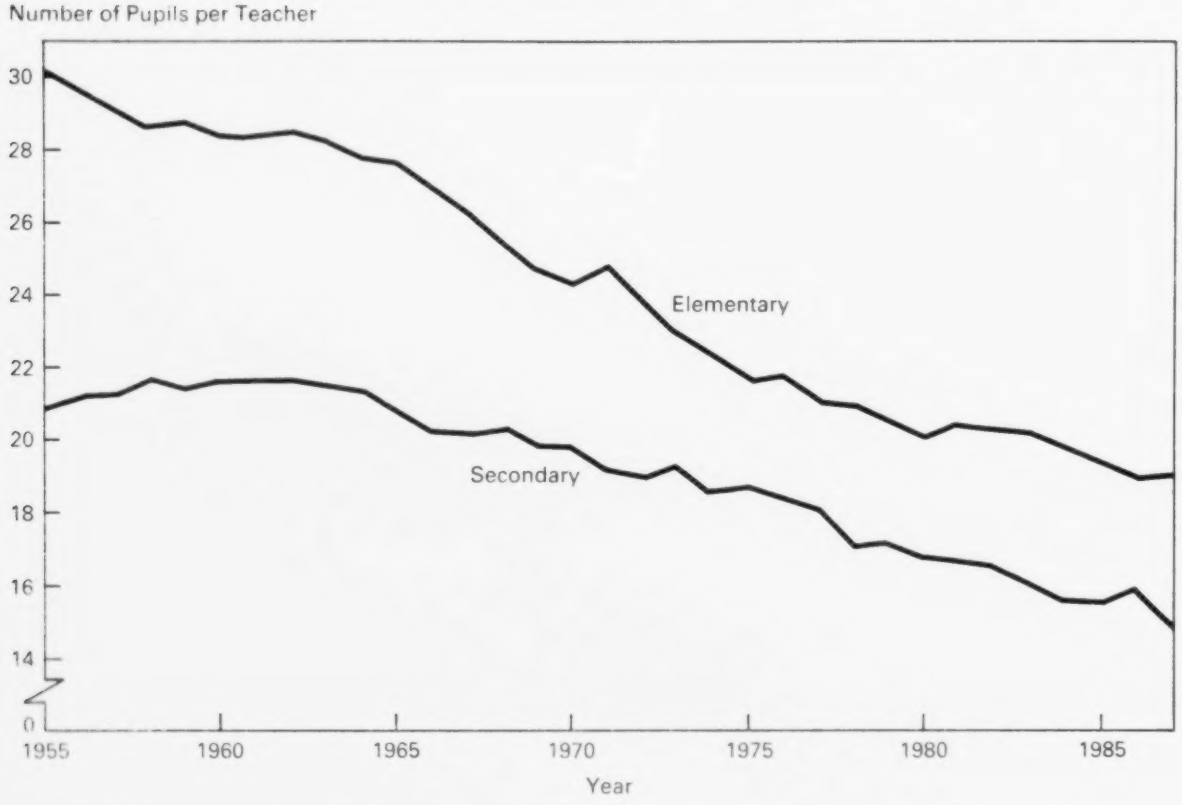
At the elementary level, over the past 25 years, classes with fewer than 25 pupils have doubled from 22 percent of the total in 1961 to 51 percent in 1986. Classes with 25-29 pupils stand at 28 percent compared with 37 percent in 1981 and 39 percent in 1976. Classes larger than 30 appear to be holding steady at about 20 percent of the total, a number about half what it was in 1961 (40 percent). The trend among elementary schools to greater numbers of classes with smaller numbers of pupils is clear.

* For errata sheet, see page 43.

Figure 2.—Pupil/Teacher Ratios in Public Schools: Fall 1877 to 1987

Source: U.S. Department of Commerce, Bureau of the Census, *Historical Statistics of the United States: Colonial Times to 1970*, Bicentennial Edition, 1975; U.S. Department of Education, National Center for Education Statistics, *Statistics of State School Systems;* and Center for Education Statistics, Common Core of Data survey and *Key Statistics for Public Elementary and Secondary Education: School Year 1987-88,* December 1987. (This table was prepared January 1988).

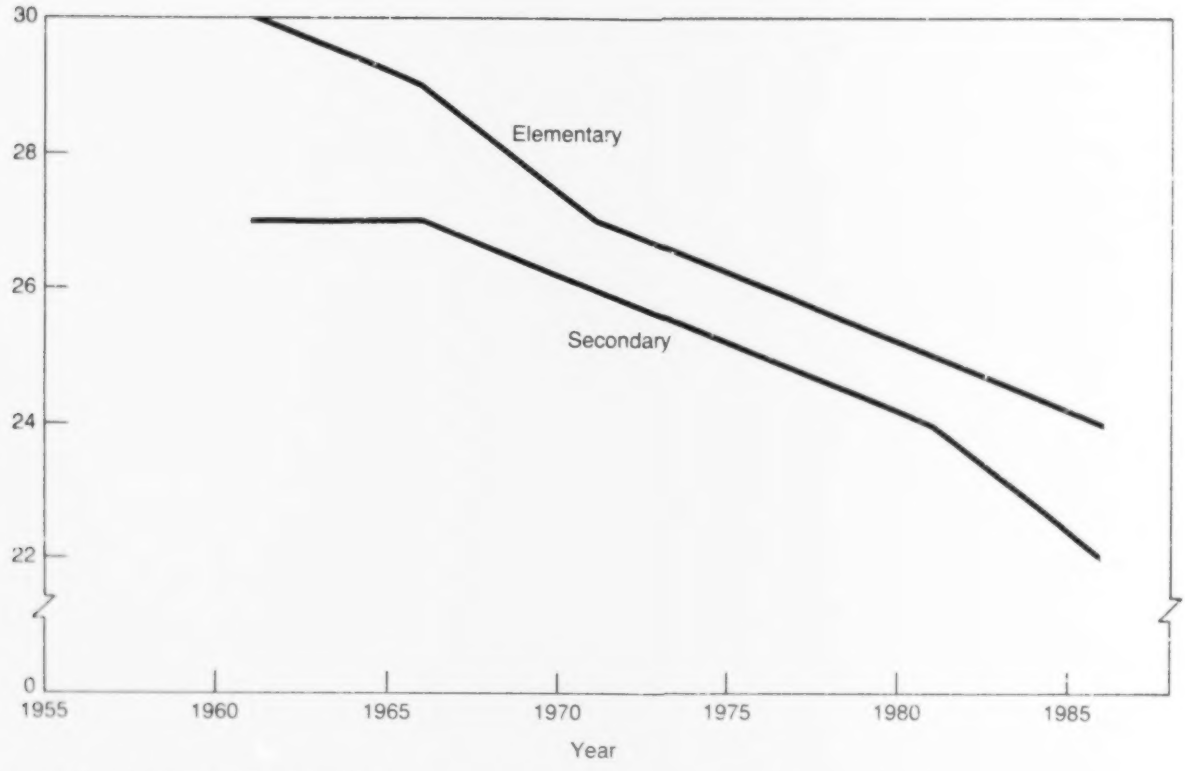
Figure 3.—Pupil-Teacher Ratio: 1955-1987



Note: 1986 data are preliminary and 1987 data are projections.

Source: U.S. Department of Education, National Center for Education Statistics, *Statistics of Public Elementary and Secondary Day Schools:* Center for Education Statistics' 'Common Core of Data' survey and *Projections of Education Statistics* unpublished tabulations.

Figure 4.—Median Class Size: 1961-1986
Public Elementary and Secondary Schools



Note: "Year" denotes spring of school year.
Source: National Education Association, *Status of the Public American School Teacher, 1985-86*, 1987.

At the secondary level, despite the uninterrupted decline in median class size, the mean number of pupils per class for 1986 is 26 compared with 23 in 1976. The reason for the apparent upturn in average class size is due to rather dramatic developments at both ends of the distribution. Classes larger than 35 almost doubled from 6.4 percent of the total in 1961 to 11.6 percent in 1986 (about what it was in 1961), thus pulling the average up. More than compensating for this development, the number of classes smaller than 20 leaped from about 29 percent to 39 percent at the same time, double their proportion in 1961 (National Education Association, 1987, p. 34). The net result is consistent with Jamison's views (above), namely, that a more rational approach to determining class size from Glass and Smith's curve would find some classes with very few pupils balanced by others with very many. Thus, many school systems may be acting to improve their classroom situations by reducing average class size where it counts most, a step that does not require additional expense or State intervention.

Pupil Load

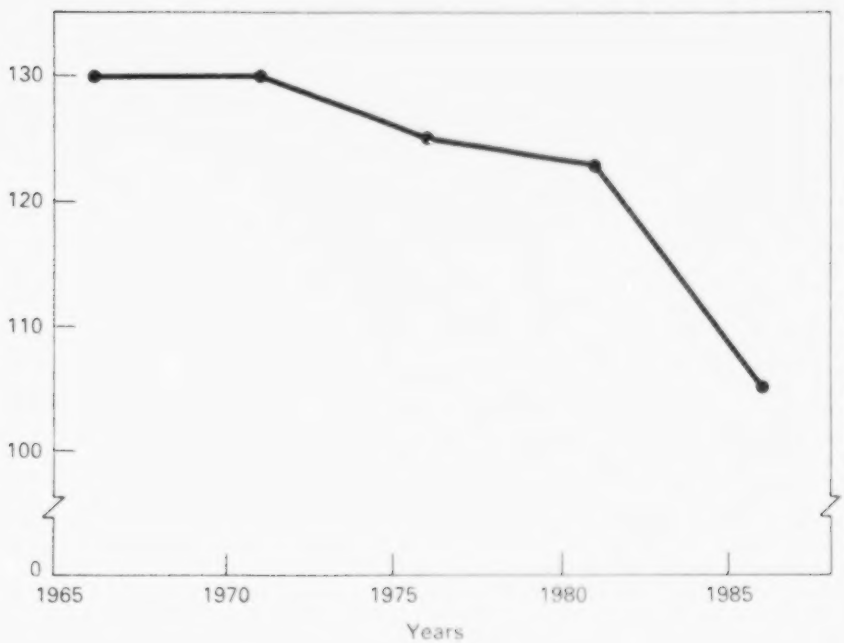
The third indicator of instructional burden is the number of pupils taught per teacher per day (Figure 5). It is an index that captures the difference in the conduct of elementary and secondary schooling. Pupil load is calculated by taking into account the number of classes taught as well as the number of students in each class. For example, if an average high school class size were 25 and each teacher taught five classes, the pupil load would be 125 per day. Pupil load thus reflects the fact that secondary school teachers teach their subject to many different students each day, while elementary teachers typically instruct the same class in many subjects throughout the day. Complaints from high school teachers usually occur when the pupil load exceeds 125, and if it reaches or exceeds 150, most educators believe the load is too great.

Figure 5 illustrates the trend of the median number of pupils per day in public secondary schools. This index, which also varies with the size of the system, declined from 130 pupils per day in 1966 to 105 pupils per day in 1986. In large systems, the median pupil load declined from 145 per day to 125 (the mean dropped from 144 to 108). In medium systems, the median fell from 132 to 105, and in small systems from 120 to 82 during the same period of time (National Education Association, 1987, p. 34-35).

Perhaps more noteworthy is the proportion of teachers whose pupil load is under 100 per day compared to those whose pupil load is 150 or more per day. Since 1961, the proportion with 100 or fewer pupils each day has grown from 22 percent to 45 percent in 1986, while the proportion over 150 has shrunk from 35 percent to 19 percent. If pupil load is an issue, it is one that is confined to large school systems, and even there responsibility for more than 150 pupils per day is a relatively rare occurrence (National Education Association, 1987, p. 34).

Taken together, none of these indices provides evidence of a mounting instructional burden that would explain, much less justify, the current spate of class size reductions or the mounting pressure for such reform. If teachers today believe that the number of students per class is too large and their workload too heavy, it is also true that the number of students they teach has never been fewer and, from that standpoint, their workload has never been lighter.

Figure 5.—Median Pupils Taught Per Teacher Per Day: 1966-1986
Public Secondary Schools



Note: "Year" denotes spring of school year.
Source: National Education Association, *Status of the Public American School Teacher, 1985-86*, 1987.

Staff ratios

In the world of limited school budgets, money spent on noninstructional personnel cannot be spent on classroom teachers. Furthermore, staff, once hired, is perhaps more difficult to reduce than the number of pupils in a classroom. For example, until recently, school enrollments have declined for several consecutive years, yet the number of school personnel has continued to grow. A profound lesson for school reform is embedded in these developments. Because past school policy and practice had been structured for more students, the costs remained about the same for the immediate future no matter how far enrollments fell (Cavin, Murnane and Brown, 1985). The lesson for those advocating smaller classes is this: once established by law and incorporated into practice, class size will not likely return to previous levels even if the reduction fails to provide the advertised benefits.

In some States, however, there are potential resources for increasing the number of teachers without increasing the budget. Just striking a more efficient balance between those who teach in the schools and those who do not could yield benefits for instructional staff. Table 1 lists the pupil/teacher ratios and the numbers and relative proportions of instructional and support staffs in each State. The notable feature of these data is the number of school employees who do not teach. On average, 52.8 percent of public school staff are classroom teachers, 39 percent of school personnel are support staff (librarians, counselors, instructional aides, clerical, maintenance, bus drivers, cafeteria workers, and the like), while 8.2 percent are members of the administrative staff (principals, supervisors, superintendents).

States differ considerably in the proportions of their school staffs that actually do the teaching. At minimum, these differences reflect the relative emphasis placed on instruction compared to other school functions, and illustrate the proportion of school resources that are spent on the primary task of education. In this sense, the proportions indicate the degree of efficiency with which the schools conduct their work: the greater the proportion of teachers to support staff, the greater the efficiency. For example, Maine and Rhode Island, with relatively low pupil/teacher ratios (about 15:1) and proportions of support and administrative staff (about 40 percent combined), are States that emphasize instructional resources over other considerations. In contrast, Wyoming (14:1) and the District of Columbia (14.3:1) boast even lower pupil/teacher ratios, but support personnel comprise 50 percent of their total staffs, suggesting two systems that provide generously for all.

More diverting, however, are those States that allot a smaller than average share of their resources to their instructional staff, and a larger than average share to support staff. Hawaii, for example, has the Nation's third highest pupil/teacher ratio (22.6:1), along with the highest proportion of support staff, 54 percent. Similarly, Michigan's support personnel comprise 52 percent of all school employees, while the pupil/teacher ratio is a relatively high 20.2:1. Whether these relationships represent operational inefficiencies or deliberate choices is unknown. It is nevertheless clear that the public school staffs in these States are relatively light on the instructional frontline, and that a reapportionment of these sectors could result in a lower pupil/teacher ratio at little or no additional cost.

In Search of the Optimum

While indicators of instructional burden have been shrinking for years, they have produced little discernible change in the profession's perceptions of workload or

Table 1.--Pupil-teacher ratio and staff in public elementary and secondary schools: Fall 1986

State	Pupil-teacher ratio, fall 1986	Public school staff, fall 1986						
		Total	Teachers		Other staff1/		Administrative staff 2/	
			Total	Percent of total staff	Total	Percent of total staff	Total	Percent of total staff
United States	17.8	3/4,247,432	2,243,370	52.8	1,657,170	39.0	346,892	8.2
Alabama	19.8	70,907	36,971	52.1	30,862	43.5	3,074	4.3
Alaska	16.7	9,810	6,448	65.7	2,626	26.8	736	7.5
Arizona	18.4	56,207	29,104	51.8	20,384	36.3	6,719	12.0
Arkansas	17.5	46,372	24,944	53.8	17,930	38.7	3,498	7.5
California	23.0	385,244	190,484	49.4	150,936	39.2	43,824	11.4
Colorado	18.2	58,537	30,704	52.5	22,393	38.3	5,440	9.3
Connecticut4/	13.7	39,284	34,252	87.2	2,568	6.5	2,464	6.3
Delaware	16.0	10,597	5,883	55.5	3,836	36.2	878	8.3
District of Columbia .	14.3	11,945	5,984	50.1	5,007	41.9	954	8.0
Florida	17.5	177,639	91,969	51.8	77,750	43.8	7,920	4.5
Georgia	18.9	111,317	57,881	52.0	45,424	40.8	8,012	7.2
Hawaii	22.6	15,892	7,291	45.9	8,029	50.5	572	3.6
Idaho	20.4	16,039	10,234	63.8	4,566	28.5	1,239	7.7
Illinois	17.4	185,572	104,609	56.4	74,917	40.4	6,046	3.3
Indiana.....	18.3	104,482	52,896	50.6	46,993	45.0	4,593	4.4
Iowa	15.5	56,825	30,958	54.5	22,975	40.4	2,892	5.1
Kansas	15.4	47,227	27,064	57.3	16,227	34.4	3,936	8.3
Kentucky	18.6	67,721	34,507	51.0	26,359	38.9	6,855	10.1
Louisiana	18.5	88,591	42,929	48.5	38,603	43.6	7,059	8.0
Maine	15.5	22,966	13,685	59.6	6,548	28.5	2,733	11.9
Maryland	17.1	72,931	39,491	54.1	28,880	39.6	4,560	6.3
Massachusetts	14.4	101,905	58,066	57.0	33,958	33.3	9,881	9.7
Michigan	20.2	171,931	83,130	48.4	61,008	35.5	27,793	16.2
Minnesota	17.4	69,836	40,957	58.6	22,631	32.4	6,248	8.9
Mississippi5/	19.0	40,687	26,219	64.4	11,682	28.7	2,786	6.8
Missouri.....	16.4	91,609	48,902	53.4	37,864	41.3	4,843	5.3
Montana5/	15.6	12,613	9,818	77.8	2,119	16.8	676	5.4
Nebraska	15.1	31,576	17,748	56.2	10,758	34.1	3,070	9.7
Nevada5/	20.4	9,212	7,908	85.8	740	8.0	564	6.1
New Hampshire	15.9	18,352	10,300	56.1	6,797	37.0	1,255	6.8
New Jersey	14.7	139,541	75,558	54.1	44,314	31.8	19,669	14.1
New Mexico	19.0	28,548	14,876	52.1	11,860	41.5	1,812	6.3
New York	15.4	317,782	168,940	53.2	115,449	36.3	33,393	10.5
North Carolina5/	18.7	105,047	58,103	55.3	41,520	39.5	5,424	5.2
North Dakota	15.3	13,693	7,779	56.8	4,849	35.4	1,065	7.8
Ohio	18.1	182,796	98,894	54.1	68,136	37.3	15,766	8.6
Oklahoma	16.9	65,253	35,041	53.7	26,817	41.1	3,395	5.2
Oregon	18.3	46,598	24,615	52.8	18,106	38.9	3,877	8.3
Pennsylvania	16.3	197,861	102,993	52.1	76,043	38.4	18,825	9.5
Rhode Island	15.0	14,317	8,916	62.3	4,088	28.6	1,313	9.2
South Carolina	17.3	61,847	35,349	57.2	21,782	35.2	4,716	7.6
South Dakota	15.6	13,903	8,031	57.8	4,685	33.7	1,187	8.5
Tennessee	19.9	80,968	41,103	50.8	34,921	43.1	4,944	6.1
Texas	17.3	374,721	185,310	49.5	166,359	44.4	23,052	6.2
Utah	23.4	30,501	17,752	58.2	10,841	35.5	1,908	6.3
Vermont	---	(6/)	(6/)	(6/)	(6/)	(6/)	(6/)	(6/)
Virginia	16.8	108,455	58,141	53.6	45,314	41.8	5,000	4.6
Washington	20.5	65,955	37,065	56.2	23,588	35.8	5,302	8.0
West Virginia.....	15.3	41,653	22,931	55.1	15,221	36.5	3,501	8.4
Wisconsin	16.3	79,086	47,039	59.5	26,901	34.0	5,146	6.5
Wyoming	14.0	14,326	7,201	50.3	6,169	43.1	956	6.7

1/Includes guidance counselors, librarians, instructional aides, school and library support staff, and other support services staff.
2/Includes officials, administrators, and administrative support staff.
3/U.S. total includes imputations for Connecticut, Mississippi, Montana, Nevada, North Carolina, and Vermont, which are not reflected in State totals.
4/Support staff not reported.
5/Support staff underreported.
6/Data not reported.
---Data not available or not applicable.

SOURCE: U.S. Department of Education, Center for Education Statistics, "Common Core of Data" survey; and unpublished estimates. (This table was prepared January 1988.)

instructional benefits. Does this mean only that the optimum size has not been reached, and that once it is, all would be well? Not likely, for despite all efforts to create such a standard, pursuit of it has had only one constant feature: the ideal number shrinks with and is always smaller than the prevailing average.

As a case in point, almost 30 years ago the New York State Teachers Association (1959) concluded that smaller classes allowed teachers to innovate, to pay closer attention to individual differences among pupils, and to employ better teaching practices. An optimum class size, the association believed, was one that gave consideration to instructional purpose, grouping, educational philosophy, pupil characteristics and different kinds of learning. These are the same claims teachers make today. Then, as now, they considered a class of 30 pupils too large, but unlike now, they judged 15 to be too small. A class of 25 was deemed optimum because it combined the attributes and benefits of small size with efficiencies of scale.

These views were echoed in two surveys conducted during the same period (National Education Association, 1960; 1963). The median elementary school classroom of the day held 30 pupils, with 87 percent of large district classes containing over 25 students and 64 percent more than 30. Two-thirds of the principals and teachers sampled believed that the optimum class size--the size at which teachers did their best job--was between 20 and 24 pupils. In fact, only 12.5 percent of teachers thought the ideal size was below 20, while 31 percent thought that 25-29 was preferable.

The justification for smaller classes today is the same as it was 30 years ago; yet a class that was then thought just right is now deemed too large. What happened during the interim? Is the optimum class size concept merely a fiction, a figure to be manipulated as a bargaining strategy? Does it underlie authentic changes in the nature of teaching or students that can only be addressed by reducing class size? Is it a foil for problems teachers are reluctant to admit or do not see? Without explanation or evidence to justify the shift, the motives as well as the conclusions of the proponents appear erratic, perhaps even suspect. If, as seems clear, both teachers' and school boards' claims about class size are deeply entangled with their respective professional and institutional interests, what then can be said of the empirical evidence concerning the association between class size and learning?

5. SIFTING THE EVIDENCE

Standardized Tests

State policymakers are frequently told that a reduction of a few students per class, especially at the elementary level, will lead to an increase in student achievement as well as improved working conditions for teachers. While the latter may well be true, it is nonetheless important to establish whether students in fact learn better in smaller classes and whether they will do so as an aggregate and on a Statewide basis. Therefore, it is necessary and worthwhile to examine evidence other than the controlled and comparatively small research studies reviewed by Glass and Smith.

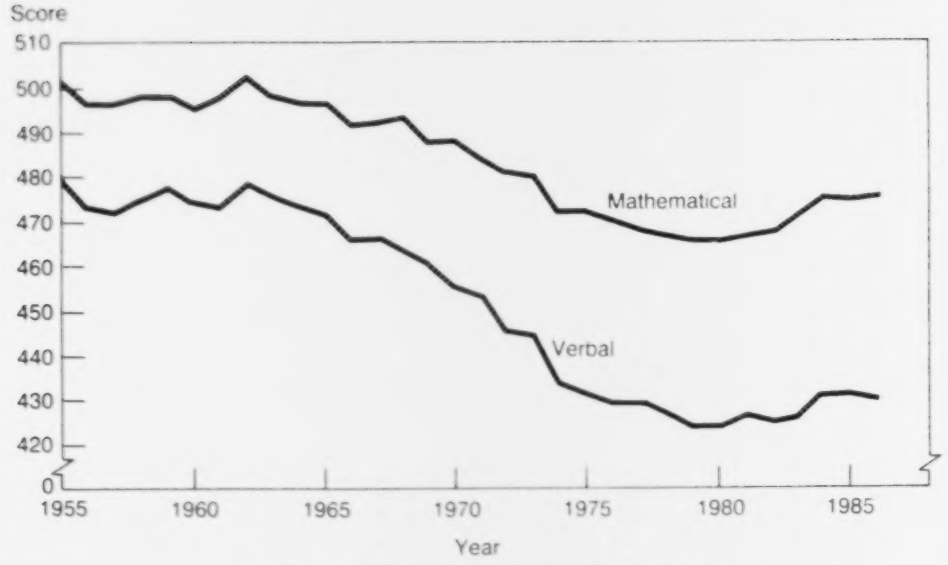
In this case, the association between Statewide average class size and standardized achievement test scores is described. This relationship is crude at best, but there is little alternative. While standardized test scores may not measure what has happened in a classroom between student and teacher, they do tell us to what extent the general academic goals of schooling are being met. Perhaps more important, test scores are recognized and accepted by the public as an index of school performance. Indeed, the public gauges the educational quality of their schools, their State and the Nation as a whole from the results of standardized tests, and it is from these tests that they will seek the benefits of smaller classes. Let us look first at student achievement levels in an era of steadily declining pupil/teacher ratios.

Standardized test scores, with rare exception, declined over the two decades prior to 1980. The decline was observed on virtually all standardized tests of academic aptitude and achievement, in all grades, among many different strata of students, in many subjects, and in every region (Koretz, 1986). Not surprisingly, this phenomenon caused great concern. Many theories about the qualities of the schools were offered to explain it, but none have fully accounted for the phenomenon. Most recently it has been argued that the declines were not due to the schools at all, but rather to an anomalous generation of students whose lowered achievement was caused by secular events over which the schools had no control (Koretz, 1987).

One explanation that no one has seriously suggested was that class size had grown too large. The reason for the omission is obvious. The average class size in the Nation's schools during the mid-60's, the apogee of achievement test scores at all levels of schooling, was about 29 pupils per class at the elementary level and 27 at the secondary. From then until the mid-70's for upper elementary grades, and until about 1980 for high schools, achievement test scores went into their skid (Figures 6a and 6b, and 7a and 7b), even as class size also declined. As test scores bottomed and even rebounded somewhat, class size has kept getting even smaller. So, we have a class size paradox: the average class size was larger when test scores were highest than it was when test scores were lowest. When the scores reached bottom in the late 1970's at the elementary level and in the early 1980's for high school exams, the average number of pupils per class had fallen by 3, to 26 and 24, respectively. This result provides little reassurance for States now proposing to raise student achievement (test scores) through similar reductions.

Some might suggest that the rebound in test scores is evidence that class size is finally reaching a point where its benefits can begin to take effect. This claim fails,

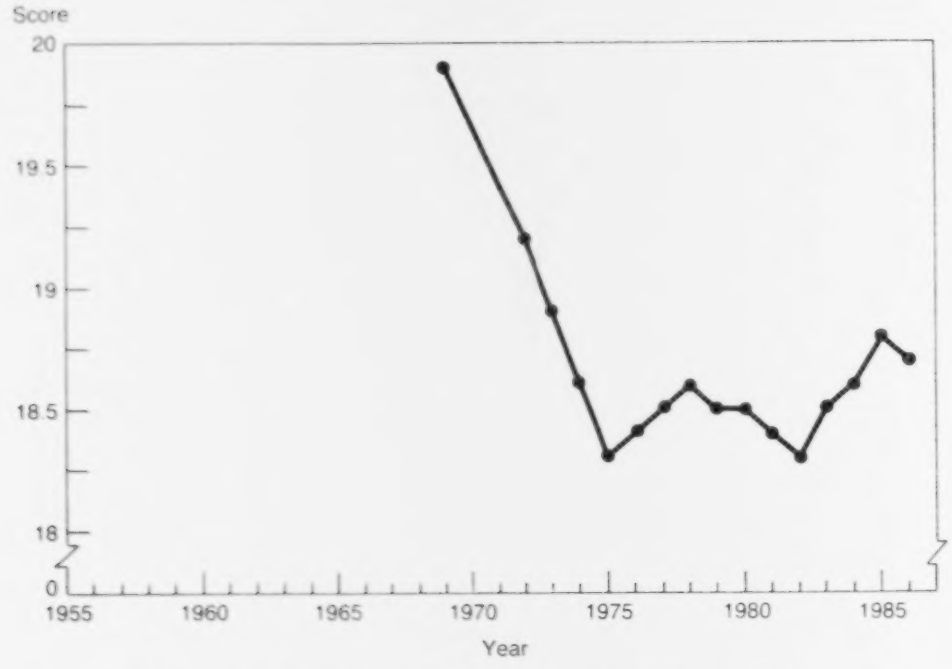
Figure 6a.—SAT Scores: 1955-1986



Note: Data for the years 1955-56 through 1970-71 are estimates derived from the test scores of all participants.

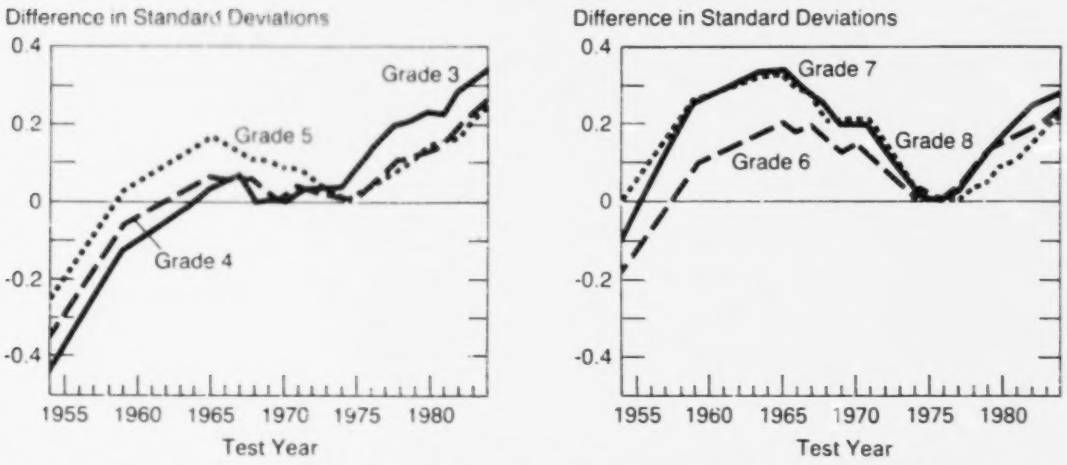
Source: College Entrance Examination Board, *On Further Examination*, 1977; and *National Report on College-Bound Seniors*, 1987.

Figure 6b.—ACT Composite Score: 1969-1986



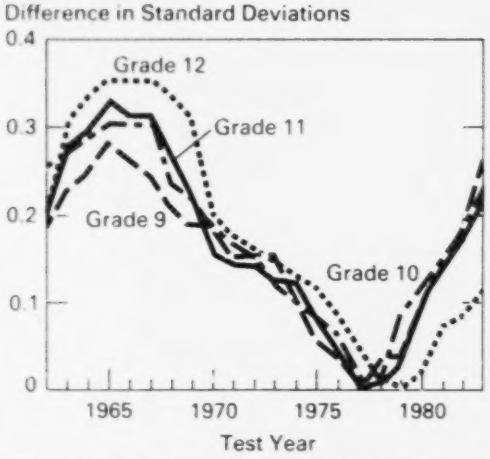
Source: The American College of Testing Program, *High School Profile Report*, 1987.

Figure 7a.—Trends in Test Scores, 1955-85: Iowa Composite, ITBS, Grades 3-8.



Source: CBO calculations based on "Iowa Basic Skills Testing Program, Achievement Trends in Iowa: 1955-1985" (Iowa Testing Programs, unpublished and undated material); and A. N. Hieronymus, E. F. Lindquist, and H. D. Hoover, *Iowa Tests of Basic Skills: Manual For School Administrators* (Chicago: Riverside, 1982).

Figure 7b.—Trends in Test Scores, 1962-83: Iowa Composite, ITED, Grades 9-12.



Source: CBO calculations based on "Mean ITED Test Scores by Grade and Subtest for the State of Iowa: 1962 to Present" (Iowa Testing Programs, unpublished and undated tabulations); Robert Forsyth, Iowa Testing Programs, personal communication, August 1984.

From: Koretz, D. M., *Trends in Educational Achievement*. Congress of the United States Congressional Budget Office, Washington, D.C. 1986.

however, not only because average class size for the students who went to school during the high scoring 1950's and early 1960's was substantially larger than class size today, but also because the recent improvement in test scores occurred among students who had moved through the system long before class size reached its current historical low. Furthermore, although the improvement in test scores appears to have steadied recently, there is reason to believe that secular trends are again educationally favorable and scores will continue to climb (Koretz, 1987). If so, there is little or no reason to seek further reductions in class size in order to yield improved student achievement.

There is one more possible association between class size and achievement test scores. Koretz (1986) observes that, with the exception of a period of about 3 years, scores on the Iowa Test of Basic Skills (ITBS) for the primary grades have been in a continuous upward trend for at least three decades, and today are at their highest level ever (Figure 7a, grades 3, 4, and 5). These scores are an anomaly compared to the relationships observed at the upper elementary and secondary levels. They are, however, consistent with scores from other tests of primary school performance and with the class size hypothesis: over the years, as class size has declined, primary grade test scores have improved. However, the Iowa test results are also consistent with two decades of emphasis on the basic skills in these grades, and the consequent closer alignment between what is taught and what is assessed with standardized tests. In the context of a singleminded curriculum, matching exams, and manageable children, class size would seem to be a comparatively minor factor in achievement. Indeed, similar features are found in the unexcelled mathematics performance of very large classes of Japanese pupils, and they are discussed shortly.

In sum, although class size cannot be ruled out of a role in the upward trend of primary grade achievement scores, two features of this association remain unchanged from the other trends: 1) achievement scores were going up when class size was substantially larger than it is now, throwing into question the need for further reductions, and 2) California State Senator Hart may have had a point when he observed that it's time to focus attention on the higher grades, since all the improvement has been at the primary level. However, if this attention takes the form of smaller classes, it will probably be a waste of money and effort.

State Comparisons

Next, the relationship between class size (pupil/teacher ratio) and average scores on college admissions tests is examined. Table 2 ranks the States by the size of their pupil/teacher ratios and the scores of college entrance exams obtained by their 1986 seniors. College-bound students in all the States generally take one of two examinations: the Scholastic Aptitude Test (SAT), especially on the two coasts, and the American College Test (ACT), most common in the Midwest and South. While some might object to using college admission test scores to assess the influence of class size on student achievement, there is no reason to believe that class size is any less important to the learning of the college bound than it is to those who will finish school at the 12th grade.

When the States' rankings on these exams are compared to their class size rankings, the relationship between average pupil/teacher ratio and student achievement assumes some unusual forms. The small New England States (for example, New Hampshire, Connecticut, Vermont) have most of the high SAT averages as well as lower than average pupil/teacher ratios. The highest ACT scores are mostly found in a northern tier of Midwestern States (Iowa, Nebraska, Wisconsin, Minnesota) and they too have lower than average size

Table 2.--SAT and ACT scores, and pupil teacher ratios in public elementary and secondary schools: 1986-87

State	SAT		ACT		Pupil-teacher ratio, fall 1986	
	Score	Rank	Score	Rank	Value	Rank
United States	906	---	18.8	---	17.8	---
Alabama	(1/)	---	18.2	19	19.8	42
Alaska	(1/)	---	18.1	20	16.7	21
Arizona	(1/)	---	19.3	9	18.4	35
Arkansas	(1/)	---	18.1	20	17.5	30
California	904	9	(2/)	---	23.0	49
Colorado	(1/)	---	19.9	5	18.2	32
Connecticut	914	5	(2/)	---	13.7	1
Delaware	917	3	(2/)	---	16.0	17
District of Columbia	852	19	(2/)	---	14.3	3
Florida	895	13	(2/)	---	17.5	29
Georgia	842	20	(2/)	---	18.9	39
Hawaii	880	16	(2/)	---	22.6	48
Idaho	(1/)	---	19.2	11	20.4	45
Illinois	(1/)	---	19.1	14	17.4	28
Indiana	874	18	(2/)	---	18.3	34
Iowa	(1/)	---	20.6	1	15.5	12
Kansas	(1/)	---	19.2	11	15.4	10
Kentucky	(1/)	---	18.1	20	18.6	37
Louisiana	(1/)	---	16.9	27	18.5	36
Maine	900	10	(2/)	---	15.5	13
Maryland	911	6	(2/)	---	17.1	24
Massachusetts	909	7	(2/)	---	14.4	4
Michigan	(1/)	---	18.9	17	20.2	44
Minnesota	(1/)	---	20.3	3	17.4	27
Mississippi	(1/)	---	16.3	28	19.0	41
Missouri	(1/)	---	19.2	11	16.4	20
Montana	(1/)	---	19.8	7	15.6	15
Nebraska	(1/)	---	20.0	4	15.1	7
Nevada	(1/)	---	19.0	6	20.4	46
New Hampshire	935	1	(2/)	---	15.9	16
New Jersey	889	15	(2/)	---	14.7	5
New Mexico	(1/)	---	17.9	24	19.0	40
New York	898	11	(2/)	---	15.4	11
North Carolina	835	21	(2/)	---	18.7	38
North Dakota	(1/)	---	18.5	18	15.3	8
Ohio	(1/)	---	19.3	9	18.1	31
Oklahoma	(1/)	---	17.8	25	16.9	23
Oregon	930	2	(2/)	---	18.3	33
Pennsylvania	894	14	(2/)	---	16.3	19
Rhode Island	898	11	(2/)	---	15.0	6
South Carolina	826	22	(2/)	---	17.3	25
South Dakota	(1/)	---	19.9	5	15.6	14
Tennessee	(1/)	---	18.0	23	19.9	43
Texas	877	17	(2/)	---	17.3	26
Utah	(1/)	---	19.1	14	23.4	50
Vermont	916	4	(2/)	---	3/14.1	---
Virginia	908	8	(2/)	---	16.8	22
Washington	(4/)	---	(4/)	---	20.5	47
West Virginia	(1/)	---	17.7	26	15.3	9
Wisconsin	(1/)	---	20.5	2	16.3	18
Wyoming	(1/)	---	19.7	8	14.0	2

1/The predominance of college-bound students in this State took the ACT.
2/The predominance of college-bound students in this State took the SAT.
3/Data are for fall 1985; data for 1986 were not available. In 1985, Vermont ranked second in pupil-teacher ratio.
4/less than 5 percent of students took the test.
---Not applicable.

SOURCE: U.S. Department of Education, Center for Education Statistics, Common Core of Data" survey; College Entrance Examination Board, unpublished data; American College Testing Program, unpublished data.
(This table was prepared January 1988.)

classes. In contrast, the lowest scores on the tests and the highest pupil/teacher ratios tend to be concentrated in the Southern region, although there are significant exceptions everywhere.

For example, California has the second highest pupil/teacher ratio in the Nation (23:1), and because of it, the State's educators complained that their teachers were unhappy and unproductive and student achievement has fallen behind States with smaller classes. There is a certain support for this view. In 1986, California was 9th among the 21 States whose college-bound students took the SAT. It is also true that the 8 States where students scored higher had an average pupil/teacher ratio of about 16:1 compared to California's 23:1. Yet California's scores rank well above the median and, at that, are probably restrained more by the burden of demography, diversity, and, until recently, no State graduation requirements, than by the size of its classes.

The tough question, of course, is whether California's taxpayers would consent to the multi-billion dollar cost required to yield 6 or 7 fewer pupils per teacher just to reach the competition's average, when an additional required academic course or two might do the trick far more efficiently (Sebring, 1987). Certainly smaller classes will not guarantee higher achievement, any more than larger ones ordain failure, especially when disadvantage and diversity are central features of the difference. As cases in point, the District of Columbia's public schools rank third on the index of class size (14.3:1), but near last on the index of achievement (19 of 22), while Oregon is 33rd of 50 in class size, but second from the top in achievement.

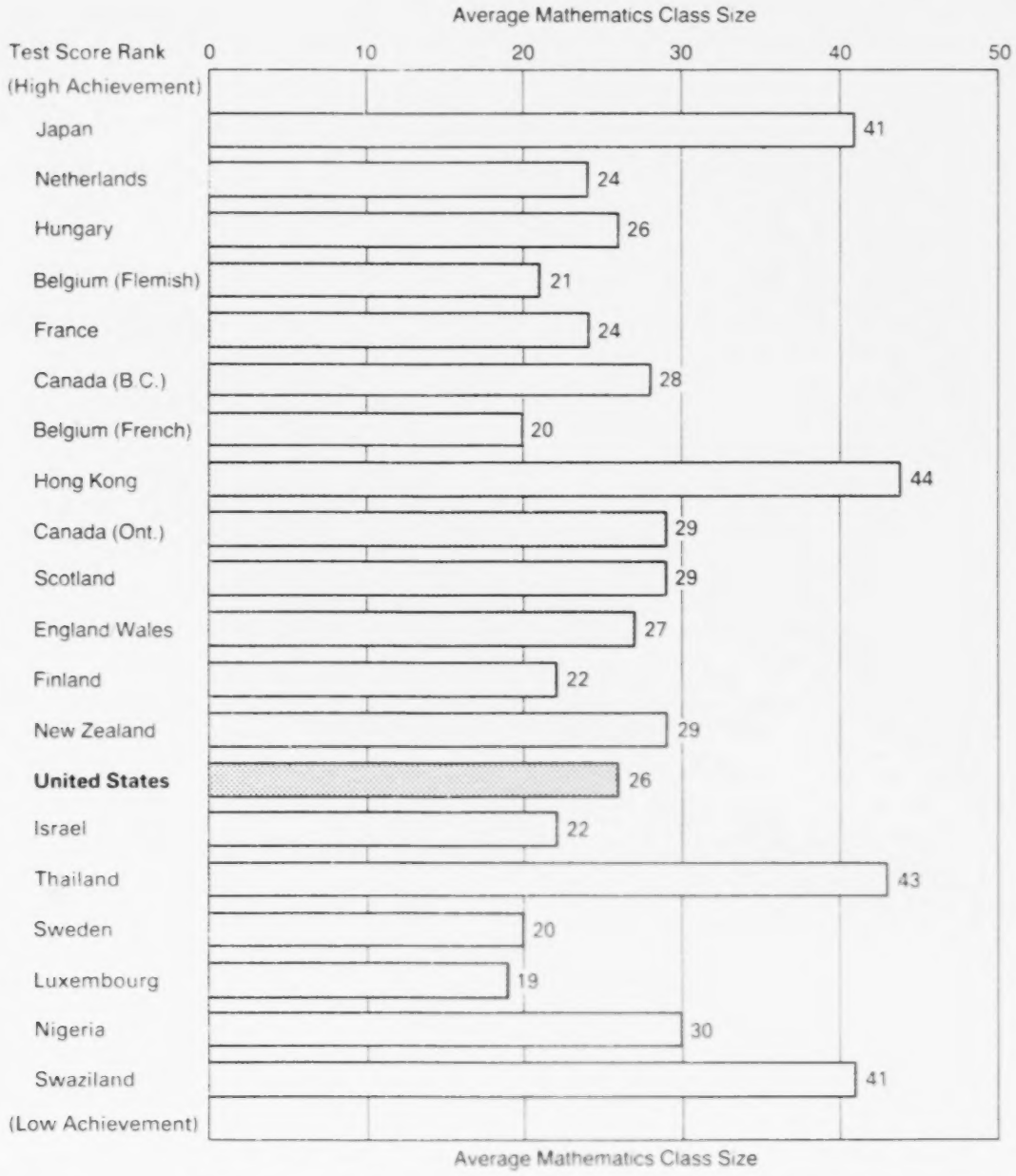
The South's comparatively low achievement and large classes are among the consequences of a long history of low budgets and lackluster learning, a condition that Southern educators and policymakers have been taking vigorous steps to change. There is, however, another set of conditions held in common by many Southern States and other low scoring States elsewhere. Compared to the States that lead the Nation in SAT/ACT test scores, jurisdictions with large numbers of disadvantaged students rank poorly on the achievement index, including those with quite low pupil/teacher ratios (for example, the District of Columbia and New Jersey).

The sense of this evidence is that the observed association between class size and test scores seems more likely an artifact of the circumstance in which instruction takes place than of the number of pupils taught per teacher. Where there is a history of educational neglect and economic privation in company with an academically indifferent milieu (for example, see Powell, et al., 1987 and Fordham and Ogbu, 1987), low achievement is the predictable consequence. In contrast, populations characterized by stability, homogeneity, and a tradition of strong educational expectations and support, typically produce high achievement. That cultural influences are strong, perhaps determining, is plain to see. That they can work for academic good as well as ill is also plain, and finds added support in the evidence from other societies.

International Comparisons

It is by now well known that the average achievement of Japanese students far surpasses that of our own children. The difference can be observed at every grade and in many subjects, most notably mathematics and science (McKnight, et al., 1987). When it comes to mathematics, however, the U.S. is not the only nation to trail the Japanese, since their students lead the world in math achievement (Figure 8).

Figure 8.—International Comparison of Average Class Size for U.S. Equivalent 8th-Grade Mathematics Classes, By Average 1982 Student Scores in Mathematics



Source: McKnight, C. C., Crosswhite, F. J., Dossey, J. A., Kifer, E., Swafford, J. O., Travers, K. J., and Cooney, T. J. The Underachieving Curriculum: Assessing U.S. School Mathematics from an International Perspective. Stipes Publishing Co., Champaign, Ill., January 1987.

More important for our purpose here, however, is what Figure 8 shows about average class size. On average, Japan has 41 pupils per class in mathematics, a figure substantially higher than the American average of 26. Moreover, it is larger than class size in the Netherlands, which, with 24, ranks second in math achievement. Note also that Luxembourg, despite having the smallest classes (19) of all, is ranked 18th.

It is, of course, theoretically possible that Japanese achievement would be even greater if classes there were smaller. Even so, international averages provide little support for the thesis that smaller classes produce higher achievement. Both the best and the worst scores come from nations with the same relatively large class size, while nations with the smallest classes are as likely to be found near the top of the achievement rankings. This evidence is entirely consistent with the domestic U. S. findings: there simply is no easy and linear relationship between class size and academic achievement.

Other, more complicated explanations are necessary to account for the inconsistencies. There are, of course, reasons for the Japanese success, and most of them are rooted in the nature of Japanese culture. Japan is an orderly nation and so are its citizens. Teachers in Japan use their instructional time more efficiently than U.S. teachers (U.S. Department of Education, 1987). Japanese youngsters study hard, follow instructions carefully, and pay close attention in class. These are traits frequently missing in U.S. classrooms where lack of "discipline" and inattention consistently top the list of teachers' and parents' complaints about students (Gallup, et al., 1987). Yet even if culturally induced hard work, attentiveness and discipline explain Japan's accomplishment, they do not explain how Japanese teachers can convey so much information to so many students so effectively.

Nor does the answer appear to lie in the teaching style, since Japanese teachers rely primarily on the lecture, a method that is used everywhere and is virtually impervious to class size variations. In the U.S., for example, the lecture was and remains the most common form of classroom instruction (Cuban, 1986; Goodlad, 1984; Sirotnik, 1983). In both high school and grade school, U.S. teachers spend 85 percent of their instructional time standing before their classes and delivering the same lesson to all. Lectures, moreover, work as well (or as poorly) with large numbers of students as with small numbers, and while lapses in the students' attention will limit a lecture's effectiveness, most academic content can be taught in this manner. If the students are attentive, disciplined, and studious, as in Japan, the amount of information that can be delivered and learned is limited only by the rate (quantity) of instruction and students' ability to absorb the material.

If the quality of Japanese instructional methods is no different from our own, what can be said about the quantity of instruction delivered in their classrooms? Table 3 illustrates just how varied are the amounts of time allocated for instruction and homework as reported in the Second International Mathematics Study (Suter, 1987). In the instance of Japan, while the school year lasts 243 days (the world's longest), the mean hours of math instruction are just 101 per year. Compare this to the 180-day school year and 145 hours of math instruction in the U.S. Furthermore, it appears that Japanese students receive the same amount of homework each week as American students (about 4.6 hours) although other sources indicate that they spend far more time in tutorial and adjunctive instruction than their American counterparts (U.S. Department of Education, 1987). Thus, although Japanese students spend more days in school, they actually receive less mathematics instruction and no more homework than most other world societies, including the U.S. Perhaps there is something different going on inside the classroom.

It has been observed that discipline and order prevail in Japanese classrooms and that the relationship between students and teachers is formal and deferential. Students are expected to perform many of the maintenance and housekeeping chores that usually fall to teachers in the U.S. Slower Japanese students expect to compensate by working harder rather than taking easier courses. Classrooms are subdivided into several "self-help" groups whose members not only help each other to learn, but maintain classroom control as well. Such practices greatly reduce the burden of classroom management. They also sound very close to the grouping practices of American schools, except that the groups are not

Table 3.—International Comparisons of U.S. Equivalent 8th-Grade Classes for Number of Days in a School Year, Hours of Mathematics Class Instruction, and Average Number of Students Per Class: 1982.

(Presented in order of total Cognitive Math Score)

Country	Mean days per school yr.	Mean hrs. math inst. per year	Mean math class size	Mean hours total weekly homework
Japan	243	101	41	4.6
Netherlands	200	112	24	6.7
Hungary	192	96	26	7.9
Belgium, Flemish	160	140	21	7.8
France	185	130	24	7.9
British Columbia, Can.	195	120	28	4.5
Belgium, French	175	150	20	6.5
Ontario, Canada	186	133	29	4.4
Scotland	200	147	29	3.9
England-Wales	192	115	27	4.2
Finland	190	84	22	4.4
New Zealand	190	130	29	4.1
United States	180	145	26	4.6
Thailand	200	100	43	6.3
Sweden	180	96	20	2.1
Average	191	123	27	5.3

Source: Kenneth Travers, Overview of the Major Findings. The IEA Second International Mathematics Study. Prepared for the Center for Education Statistics, January 1987. Compiled and constructed by Larry Suter, Center for Education Statistics.

composed according to ability and they are self-governing. These features satisfy the sort of aspirations that American teachers believe can be fulfilled only with fewer students.

Paradoxically, these practices also help Japanese teachers spend substantially fewer hours in the classroom than their U.S. counterparts. The time thus released provides them a good deal more time for grading homework and planning lessons, a result that American teachers also believe can come about only through smaller classes. The efficiency with which Japanese teachers manage their time does not, however, relieve Japanese teachers of their sense of responsibility to their students or of their need to "awaken the desire to try." In the Japanese scheme of things, luck, family background, and personality traits do not play a role in determining achievement. Learning is caused by hard work, and it is shaped by steadily urging students to do their best (U.S. Department of Education, 1987).

Based on all these findings, Japan's evident advantage over the U.S. in student achievement and teaching efficiency is probably due to the following factors:

1) the students' industry coupled with extremely high expectations that ultimately obscure their ability differences;

2) a form of classroom organization and management that emphasizes student participation and self-control, thus reducing instructional time spent ("lost") on individuals and on classroom control; and

3) a uniform curriculum and instructional method that ignore ability differences and minimize the need for individual curricular requirements.

In contrast, U.S. teachers, while sharing Japan's reliance on the lecture, are unable to exploit its virtues as do the Japanese. The reasons for this have little to do with class size, but much to do with social and cultural differences between the nations. In the U.S., for example, we don't expect all of our students to work so hard, sometimes because we believe it's not good for them, sometimes because they are "undisciplined," and sometimes because we don't think they can learn anyhow. We cherish local and State control of the curriculum rather than a National standard, even if it means great variability in the achievement of our children. And we pay close attention to individual and group needs, even if many learn less because of it.

Nevertheless, if Japan's schools do not provide a model for the U.S., they are instructive on the issue of class size. Certainly one must conclude from a look at Japan that large classes, per se, need not inhibit academic achievement. Japanese teachers manage to provide large classes of pupils with academic experience that American teachers believe can only be accomplished with smaller classes.

7. WHAT CAN TEACHERS DO?

Even if we were to assume that the instructional dreams of teachers are feasible, that classes could be substantially smaller and innovative practices would thereby become possible and practical, there is little reason to believe that today's teachers are prepared to seize the instructional opportunities that smaller classes afford. As we have seen, lectures consume most of the instructional time at all levels of schooling, despite the fact that the practice is decried throughout education. Teachers claim that with smaller classes all those things that larger ones forbid would be possible: the opportunity to devote more attention to individual problems, to develop better rapport, to furnish more enrichment and extracurricular materials, to go on more field trips, provide more creativity, and develop a more relaxed and informal environment. However, given the opportunity to put these ideas into action, surprisingly few teachers do so, even though they say they intend to change and sometimes believe that they have (Larkin and Keeves, 1984; Newmann, in press; Shapson, et al., 1978; Sirotnik, 1983).

Shapson, et al., observed, for example, that 3rd- and 4th-grade teachers were certain that they preferred smaller classes of 16 and 23 compared to 30 and 37. These teachers believed firmly that with the smaller size, they had improved classroom control, promoted more frequent interaction with pupils, and increased the use of innovative procedures. They also reported making many changes in layout, assessment, and class management. Yet when their behavior was observed during class time, little evidence turned up to support their perceptions. Despite these failings, the authors still concluded that, "Even though the observational data do not seem to give these [teacher perceptions] much support, they must not be ignored; teachers do prefer to work in a smaller class."

A fair question to ask, then, is how much are we willing to pay for teacher preference alone, if tangible benefits for students are illusory? Shapson, et al., noted that, other things being equal, decreasing class size was an expensive step. They also point out that if it is taken without providing the teachers with the training necessary to take advantage of the opportunities, it is likely to be a waste of resources. Finally, they observed that "if class size were to be changed by legislation, it was extremely unlikely that a well-defined in-service training program would be included in that legislation." If this conclusion is correct, teachers will probably continue to do the things they've always done, except with fewer students. In fairness to U.S. teachers, this distinction between intent and action is a problem worldwide. Anderson (1987) reports that the classroom behavior of teachers in nine other countries tends to be unchanging over time, and "the repertoire of behaviors they exhibit with any frequency within their classrooms is quite small."

Plainly, teachers will have to be carefully educated to provide the alleged benefits of smaller classes, a suggestion that was made over 20 years ago by McKenna and Pugh (1964). Smaller classes may release time for more planning and graded homework, as well as reduce the number of unruly children in the room, but these are hardly innovative practices, even though they might advance achievement. And they need not rely on smaller classes for their implementation. Surely there are other, more economical as well as more effective ways to improve the conditions of teachers' occupational lives and the academic achievement of their students.

For example, rather than taking the easily comprehended but simplistic route of reducing class size to improve student achievement, teachers and policymakers could instead consider more complicated but probably more practical dimensions of school improvement. For illustration, we could assess how and to what extent the quality of instruction in today's classrooms is influenced by the size and composition of the class. This idea is by no means original. A number of scholars, for example Shapson (1978) and Bourke (1986), have sought to distinguish between the problems created by too many pupils and those stemming from too little teaching. It is not as though we don't know how to improve the instructional competence of classroom teachers, since research on teaching has greatly advanced our knowledge of effective classroom management and teaching techniques that work (Wittrock, 1985). The fact is, we do know good teaching when we see it, and we also know why it is successful (Shulman, 1987).

That teachers can be taught to manage complicated classroom situations is beyond question. Whether they should be expected to learn these skills or whether the size of their classes should be reduced to obviate their need for them, is at the heart of the present debate.

* Albert Shanker, president of the American Federation of Teachers, has chosen to face the issue squarely. Noting that widespread concern about teacher competence has placed intense pressure on schools of education to raise their admission and performance criteria, and citing the creation of a National Board for Professional Teaching Standards as central to a new effort to devise professional standards, Shanker (1985; 1986) thinks it is critically important that teachers seek to improve their performance by strengthening their skills rather than by teaching fewer children. Doing better by doing less will not convince the public or its policymakers of teachers' competence and professionalism.

But whether class size is reduced or not, teachers will require additional training if improved pupil performance is to result. In the first instance they must be prepared to take full advantage of the smaller size. In the second, they must learn to better manage the diversity that accompanies our mixed culture, the pride and the challenge to American society and its schools.

* For errata sheet, see page 48.

SUMMARY

The natural appeal that smaller classes hold for parents, and the fact that many teachers believe small classes are a much needed education reform has prompted many States to consider smaller classes as a school improvement measure. Nevertheless, the cost of reducing average class size by even a few students is very large and, of itself, the measure is not likely to enhance school outcomes.

Evidence to date, from research and practice, does not generally support a policy of limiting class size in order to raise student achievement or to improve the quality of worklife for teachers; nor does it justify small reductions in pupil/teacher ratios or class size in order to enhance student achievement. Research also fails to support school policies designed to lower class size if these do not first specify which pupils will benefit and how and why they will do so.

Given the high costs and uncertain benefits, there are other strategies that deserve consideration before steps are taken to reduce class size. For example, improving teachers' instructional competence will also lighten their workload by helping them to perform more effectively in the classroom. Furthermore, to the extent that learning depends on instructional quality, improved teacher competence will also raise student achievement. Strengthening instructional competence is consistent with the growing trend to professionalism and with the creation of the National Board for Professional Teaching Standards as recommended in A Nation Prepared: Teachers for the 21st Century (Carnegie Forum, 1986).

Certainly, enhancing the status and image of teachers by improving their ability to meet higher standards of competence will produce greater educational returns for all parties than will the costly strategies to reduce workload by reducing the size of the task.

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COMPUTATIONS

The costs of reducing class size were computed from the following data for the year 1985-86 (CES, 1987, pp. 35-36):

1. Current number of teachers in the U.S.: 2,276,368

2. Current average class size: 24

3. Current expenditures per teacher: $68,295

4. Current total enrollments: 40,200,086 pupils

   The number of full-time-equivalent (FTE) teachers required for regularly scheduled classes averaging 24 pupils: 40.2 million/24 = 1,675,004.

   The number of FTE teachers required for regularly scheduled classes averaging 23 pupils: 40.2 million/23 = 1,747,830

   The number of FTE teachers required for regularly scheduled classes averaging 20 pupils: 40.2 million/20 = 2,010,004

   The number of FTE teachers required for regularly scheduled classes averaging 15 pupils: 40.2 million/15 = 2,680,006.

5. Sample computation: class size 23.

The difference between class size 23 and 24 is about 4 percent. A conservative estimate would compute the costs of the number teachers necessary to teach in the added classes, that is, 1,747,830 less 1,675,004 = 72,826 additional teachers required.

If all teachers are included, that is, if the size of special education classes is reduced as well as regular classrooms, the additional teachers required are 2,276,368 total current FTE times 104 percent additional required = 2,375,341 total FTE required less 2,276,368 total current FTE = 98,973 additional FTE required.

Costs are figured by multiplying the difference between number of teachers required for class sizes of 24 and for 23, times the cost per teacher. Cost per teacher includes total costs for support except construction and interest:

(72,826)($68,295) = $4,973,638,894 cost for regular class only

(98,973)($68,295) = $6,759,288,478 cost for all FTE.

6. Cost and added teachers for a class size of 20 students (120 percent of total current FTE):

a) Regular classroom teachers only: cost, $22,878,738,912; teachers, 335,001.

b) All FTE: cost, $31,092,727,000; teachers, 455,274.

7. Cost for a class size of 15 students (160 percent of current FTE):

a) Regular classroom teachers only: cost, $68,636,216,737; teachers, 1,005,002.

b) All FTE: cost, $93,278,181,000; teachers, 1,365,821.

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Errata Sheet

Class Size and Public Policy
Politics and Panaceas

Office of Educational Research and Improvement
U.S. Department of Education

On page 14, in the section entitled Pupils Per Class, the second paragraph, second sentence should read:

At the secondary level, the trend is also toward smaller classes, and the median size has declined from 27 in 1961 to 22 in 1986.

On page 36, delete the third paragraph and substitute the following:

Albert Shanker, president of the American Federation of Teachers, has chosen to face the issue squarely. Noting that widespread concern about teacher competence has placed intense pressure on schools of education to raise their admission and performance criteria, and citing the creation of a National Board for Professional Teaching Standards as central to a new effort to devise professional standards, Shanker (1986) says: "Professionalizing teaching means all the things this union has long stood for and worked for: higher salaries; smaller class size, a manageable work load and relief from nonteaching chores. It means working conditions that other professions so take for granted that they often go unmentioned: an office, a desk, a telephone, a quiet place. It means enough textbooks to go around, equipment that doesn't fall apart, school buildings that are clean and safe. It also means time for preparation and new learning and for discussion and work with one's colleagues.

"But true professionalism requires an even more basic prerogative that then these, and it is the recognition of this that distinguishes the AFT report and the Carnegie report from those that preceded them. The central recommendation of the new reports is to <u>empower</u> teachers, to give teacher control over the standards of their profession and the conduct of their work."